

*Atty Docket HES 99.035U1C1
(1391-40500)*

Patent

CLAIMS

Listing of Claims:

1-20 (Canceled)

21. (Previously Presented) A foamed cement composition having a set pumping time and a quick set at temperatures as low as about 32°F comprising:

a calcium aluminate cement;

a set accelerating additive;

a retarder;

water in an amount sufficient to form a foam; and

a mixture of cement composition foam forming and foam stabilizing surfactants present in an amount sufficient to facilitate the formation of and stabilize said foam.

22. (Previously Presented) The cement composition of claim 21 wherein said calcium aluminate cement has an alumina content of about 80% by weight of said cement.

23. (Previously Presented) The cement composition of claim 21 wherein said set accelerating additive is a lithium salt selected from the group consisting of lithium chloride, lithium carbonate, lithium sulfate and lithium hydroxide.

24. (Previously Presented) The cement composition of claim 21 wherein said lithium salt is lithium chloride.

25. (Previously Presented) The cement composition of claim 21 wherein said set accelerating additive is present in said composition in an amount in the range of from about 0.1% to about 1% by weight of cement therein.

26. (Previously Presented) The cement composition of claim 21 wherein said retarder is selected from the group consisting of citric acid, gluconic acid and tartaric acid.

27. (Previously Presented) The cement composition of claim 21 wherein said retarder is citric acid.

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28. (Previously Presented) The cement composition of claim 21 wherein said retarder is present in said composition in an amount in the range of from about 0.5% to about 2% by weight of cement therein.

29. (Previously Presented) The cement composition of claim 21 wherein said water is selected from the group consisting of fresh water and salt water.

30. (Previously Presented) The cement composition of claim 21 wherein said water is present in said composition in an amount in the range of from about 40% to about 50% by weight of cement therein.

31. (Previously Presented) The cement composition of claim 21 wherein said gas is selected from the group consisting of air and nitrogen.

32. (Previously Presented) The cement composition of claim 21 wherein said gas is nitrogen.

33. (Previously Presented) The cement composition of claim 21 wherein said gas is present in said composition in an amount sufficient to foam said composition to a density in the range of from about 10 to about 12 pounds per gallon.

34. (Previously Presented) The cement composition of claim 21 wherein said mixture of foam forming and foam stabilizing surfactants in said composition comprises an alcohol ether sulfate ethoxylated with from about 3 to about 10 moles of ethylene oxide, an alkyl or alkene amidopropylbetaine and an alkyl or alkene amidopropyl dimethylamine oxide.

35. (Previously Presented) The cement composition of claim 21 wherein said mixture of foaming and foam stabilizing surfactants is present in said cement composition in an amount in the range of from about 1% to about 4% by weight of water in said composition.

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36. (Previously Presented) A foamed cement composition having a set pumping time and a quick set at temperatures as low as about 32°F comprising:

a calcium aluminate cement having an alumina content of about 80% by weight of said cement;

a set accelerating additive selected from the group consisting of lithium chloride, lithium carbonate, lithium sulfate and lithium hydroxide present in said composition in an amount in the range of from about 0.2% to about 0.5% by weight of cement therein;

a retarder selected from the group consisting of citric acid, gluconic acid and tartaric acid present in said composition in an amount in the range of from about 0.5% to about 1.5% by weight of cement therein;

water selected from the group consisting of fresh water and salt water present in said composition in an amount in the range of from about 40% to about 50% by weight of cement therein;

nitrogen gas present in said composition in an amount sufficient to foam said cement composition to a density in the range of from about 10 to about 12 pounds per gallon; and

a mixture of foam forming and foam stabilizing surfactants comprised of an alcohol ether sulfate ethoxylated with from about 3 to about 10 moles of ethylene oxide, an alkyl or alkene amidopropylbetaine and an alkyl or alkene amidopropyl dimethylamine oxide, said mixture being present in said composition in an amount in the range of from about 2% to about 3% by weight of water in said composition.

37. (Previously Presented) The cement composition of claim 36 wherein said set accelerating additive is lithium chloride.

38. (Previously Presented) The cement composition of claim 36 wherein said retarder is citric acid.

39. (Previously Presented) The cement composition of claim 36 wherein said water is salt water.

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40. (Previously Presented) The cement composition of claim 36 wherein said mixture of foam forming and foam stabilizing surfactants comprises said ethoxylated alcohol ether sulfate in an amount in the range of from about 60 to about 64 parts by weight, said alkyl or alkene amidopropylbetaine in an amount in the range of from about 30 to about 33 parts by weight and said alkyl or alkene amiopropyldimethylamine oxide in an amount in the range of from about 3 to about 10 parts by weight.